Remarks.—Specimens from northern Lower California resemble those from San Diego, and clearly belong to the same form, but as they are more or less worn they are not included in the table of measurements. These specimens are the same ones referred to by Mr. Anthony (Zoe, IV, 1893, 242) as being "practically indistinguishable from southern California examples", but he seems not to have suspected that the latter were not true *ruficeps*. *A. ruficeps canescens* is really intermediate in its characters between *A. ruficeps ruficeps* and *A. ruficeps sororia*, but is grayer than either, and is evidently as well entitled to recognition as certain other races of birds found in this general region. It doubtless grades into the former in Los Angeles County, California, as indicated by a specimen from Pasadena (Mus. Vert. Zool., no. 35813), but where it meets the range of *A. r. sororia* is an undetermined question.

Specimens examined.—California: San Diego, 3. Lower California: Guadalupe Valley, 1; Sansal del Comanche, 3; Piñon, 1; Todos Santos Island, 2. Total, 10.

My acknowledgments are due to the authorities of the several institutions already specified for the loan of material for comparison, and to Dr. Harry C. Oberholser for his advice.

Carnegie Museum, Pittsburgh, Pennsylvania, May 11, 1922.

STATUS OF THE CRESTED JAYS ON THE NORTHWESTERN COAST OF CALIFORNIA

By JOSEPH MAILLIARD

WITH MAP

SINCE the year 1908, when it was found that the crested jay of that part of the Humid Coast Belt lying in Sonoma County, California, was not distinguishable from the Blue-fronted Jay (*Cyanocitta stelleri frontalis*) of the interior mountains and the southern portions of California, the idea of intergradation on the northwest coast of this state between the Steller Jay (*Cyanocitta stelleri stelleri*), of the southern Alaskan and British Columbian coasts, and the Coast Jay (*Cyanocitta stelleri carbonacea*), of the central humid coast belt, has, in my judgment, been open to doubt. It hardly seemed reasonable that there should be such an intergrading toward the north when the Coast Jay is not only cut off abruptly in the central humid coast belt by a strip of non-coniferous association, unattractive to this genus, in northern Marin and southern Sonoma counties, but its distribution also is interrupted by the appearance of the Blue-fronted Jay on the opposite side of this non-coniferous barrier.

In 1902, Dr. Walter K. Fisher published an article upon the status of *Cyanocitta stelleri carbonacea* (Condor, IV, pp. 41-44), in which he gives the distinguishing characteristics of the different members of the genus *Cyanocitta* on the Pacific Coast, illustrated by a map showing their distribution as understood by him at that time. This paper was written not long after the Coast Jay was described by Grinnell (Condor, II, 1900, p. 127), when much less was known of

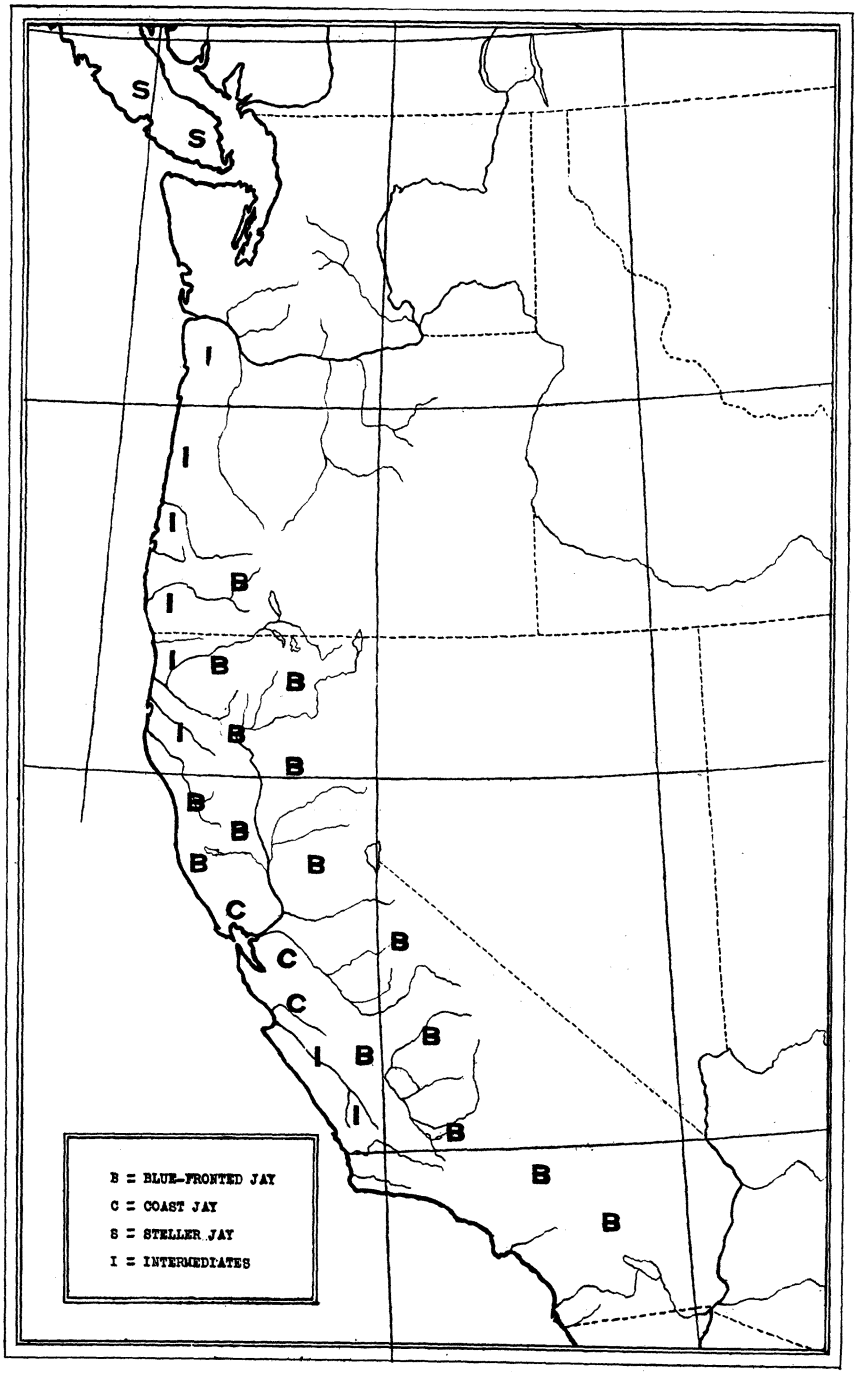

Fig. 33. MAP SHOWING DISTRIBUTION OF THE DIFFERENT RACES OF CRESTED JAYS ALONG THE COAST LINE FROM VANCOUVER ISLAND SOUTH TO EXTREME SOUTHERN CALIFORNIA.

these races than at present, and when there was a comparatively limited number of specimens at Dr. Fisher's disposal.

From his conclusions I infer that insufficient attention was given to the matter of using strictly comparable stages of plumage, or to the consideration of the dates of capture of specimens examined and the various degrees of fading of colors shown at different seasons of the year. It is obviously unfair to compare specimens from one locality, of one season, with those from a different locality of another season of the year. There is too much seasonal change in such cases to allow of fair comparison, and I think that some of the errors that have been handed down have come about through failure to emphasize this principle. Dr. Grinnell (Auk, XIX, 1902, p. 128) remarks in this connection, that "a series of *Cyanocitta stelleri* from the cloudy, humid Sitkan District taken in June and July show but slight traces of wear; while specimens of *Cyanocitta stelleri frontalis* from the arid Sierra Madre Mountains of southern California taken at the same season are so ragged and faded as to almost completely destroy the fresh fall coloration".

Examination of a large number of specimens, some of them many years old, taken at different seasons of the year, shows that fading, induced by exposure in the case of live birds (or by age in the case of even many well-kept skins) reduces the proportion of black and increases the amount of brown on the heads and backs of the three races considered in this paper. Some fading takes place in *stelleri*, but the mantle remains very dark, with less brown showing than in *carbonacea*. In the case of *carbonacea* the brown is very evident even in fresh plumage and becomes more pronounced as the seasonal changes progress, ending with a rich or warm brown by the beginning of the summer molt.

The first of these races is the darkest all over, with the mantle a very dark brown, or "warm slate black" as some authorities have it. The second is a lighter colored bird, with the mantle much more brownish, or a "warm slate gray"; while *frontalis* is much lighter yet, and has the mantle of a dark mouse gray which, in fresh autumn plumage, shows very little trace of brown. In this last race the head and crest are of a bluish black that contrasts quite strongly with the mouse gray of the back, the contrast being much greater here than in either of the other two races. One of the distinguishing characteristics of *frontalis* is this bluish wash that pervades not only the black of the head, but all of the darker parts.

On specimens taken at Requa, Del Norte County, California, in fresh plumage (September) there is a barely perceptible tinge of brownish to the dark bluish slate, or mouse gray, of the mantle, or to the (almost) black of the head and crest; whereas on specimens from the same locality taken in May, the tinge of brownish, while still slight, is very easily discernible, but it is not the same brown as that of *carbonacea*. It is a much lighter brown, and towards fall the old worn feathers become a grayish brown.

As compared with birds from Requa, autumn specimens taken progressively farther south along the coast show a lighter slate on the back and less depth in the black of the head, but the bluish wash is distinctly present. The gray on the throats of these northwest coast birds is lighter and the area covered by it is much more extended than it is in *carbonacea*, it being very similar in these particulars to that of *frontalis*.

The blue of the underparts of all the races of *Cyanocitta* varies a great deal with individuals. Some of the Requa birds tend strongly toward the blue of *frontalis* while others are of darker hue, but, even with these of darkest blue, the rump is lighter than that of *stelleri* or even of *carbonacea*. In these northwest coast specimens secured by us, the blue frontal spots are very conspicuous in nearly all of the adult birds, very much like the "blue *fronts*" of *frontalis*, and on the average much more conspicuous and extended than they are with *carbonacea*. This character is much restricted in *stelleri*.

One of the difficulties in making the differences in coloration clear to the reader is due to the variety of definitions given by different authors to the colors of the parts of the various subspecies of this jay. For instance, in four of our leading publications which are recent enough to consult for the purpose, the color of the back and scapular region in the case of the Steller Jay is given as follows: "deep black, or brownish black", "dark sooty brown", "fore parts of body dull blackish", and "sooty brown"; while Dr. Fisher, in the CONDOR article already quoted, calls it "warm slate black". This last description is to my mind the most suitable, if Ridgway's Nomenclature of Colors is used as the basis of comparison. Again, the second and third of the above authorities, in the same order, give these parts of the Coast Jay as, "slaty brown or brownish slate", and "back warm slate gray"; while Fisher gives the color as "warm slate gray", with which I do not so readily agree. In the case of the Blue-fronted Jay the colors run as follows: "brownish slaty", "hair brown, broccoli brown or drab", "fore parts of body brownish slate", and "similar to No. 487 (*stelleri*) but back paler"; while Fisher calls it "mouse gray", which seems to me to be correct.

Dr. Fisher made a trip to the northwest coast of this state in 1899, and, in a paper published soon after, stated that the jay of the Humboldt Bay region was typical *carbonacea*, both in summer and winter (Condor, 1902, p. 133). Now, if Dr. Fisher was correct in this diagnosis, at what point on the coast, between the Blue-fronted Jay habitat in Sonoma County, and Humboldt Bay, did the latter form give way again to the Coast Jay? Between the mouth of the Russian River, in Sonoma County, now known to be inhabited by the Blue-fronted Jay, and Humboldt Bay, there are no non-coniferous areas of any size, none large enough to make a barrier against this genus. The character of all this coast stretch—the nature of the association, and the climate—is practically the same throughout, differing only in degree. This being the case, where and why would the Blue-fronted Jay, which inhabits a cross-section of the state in all suitable localities, straight east from the mouth of the Russian River to the Sierras, merge into the Coast Jay to the northward? Or, why should the Coast Jay interpolate itself into the realm of the Blue-fronted in such a leap-frog fashion.

Opportunity presented itself for a visit to Eureka in June, 1916, and during my stay there several specimens of the jay were obtained from the Humboldt Bay region. The plumage of the birds taken at that season of the year was poor for comparisons, but I remarked at the time upon the light coloration of these specimens as compared with Coast Jays from the central coast district (Condor, XVIII, 1916, p. 199), and called attention to a certain similarity between them and specimens from Sonoma County, which latter have since been acknowledged to be good *frontalis*. However, not enough evidence had yet been brought to bear upon the points involved, and but little interest in the matter had so far been

aroused for the reason that no one else questioned the dictum of the authorities, who had stated that the Coast Jay occupied the Humid Coast Belt in California from the Santa Lucia Mountains, in southern Monterey County, north to the Oregon line.

As no further light upon this subject seemed to be forthcoming, and as this sort of work could be combined with other interests in the same line, it was decided to map out the field work of the Department of Ornithology of the California Academy of Sciences for the year 1921 so as to cover this northwest coast region and decide the matter definitely. This field party comprised two members, Mr. Chase Littlejohn, assistant curator, and myself for the spring work, with Mr. Chester C. Lamb temporarily taking Mr. Littlejohn's place for the fall work.

Breeding specimens of the crested jay were obtained at Patrick's Hotel and at Requa, Del Norte County, the former place being situated in the mountains about twenty or twenty-five miles in a straight line from the ocean, and the latter at the mouth of the Klamath River, practically on the ocean; while a few were also secured at Myer's Ranch, Humboldt County, probably eighteen miles inland, during the spring work. Every one of the specimens so obtained showed a closer approach to the Blue-fronted than to the Coast Jay! Yet it was difficult to say what dates of capture of the spring birds of the northwest coast would correspond with those of specimens from the central coast region so that the comparison might be a just one, since the northern season is so much colder and later than that of the central area.

To overcome this element of doubt, the fall trip was made over practically the same ground, but specimens were collected in more places, these being from north to south as follows: Requa, Del Norte County; Kneeland Prairie (16 miles in bee line east of Humboldt Bay), Petrolia (5 or 6 miles from the ocean), Thorn (same distance inland), all in Humboldt County; and Cummings (over 20 miles inland), Mendocino County.

The birds from all these places are in fresh new plumage, in the best possible state for comparison with birds in similar plumage elsewhere. The spring birds, taken in the third week in May, from Patrick's Creek, are practically *frontalis*, somewhat darker than typical specimens of this race, but as near typical as are many other specimens that are unquestionably placed with *frontalis*. Patrick's Creek is a tributary of Smith River, and the coniferous forest covering the canyons of these streams is thus directly connected with that of the sea-coast, with no break of any magnitude in the way of country unsuited to this jay.

In April and May a good series of jays was obtained at Requa, and they proved to be darker than any taken south of that point; but the decidedly brownish tinge of the crest, head, neck and back of the Coast Jay is not noticeable in those parts of the spring birds from Requa when compared with the former. In these latter birds there seems to be a slight brownish cast when they are looked at by themselves, but this disappears on comparison with *carbonacea*, when the resulting contrast makes the head of the Requa birds look black, or slaty black. The crest feathers of the Requa birds seem to match the Black or Slate Black of Ridgway's Nomenclature of Colors more nearly than they do any of the other combinations or hues.

The back of the northwest coast jays appears to be nearer to the Dark

Mouse Gray of Ridgway's Nomenclature of Colors than to anything else, thus according with Dr. Fisher's description of the back of *frontalis*, in which he states positively that the back is "mouse gray", while he gives the back of *carbonacea* as "warm slate gray". In these northwest coast jays there is the distinct blue wash over the darker parts, when viewed in the right light, and in none of these does the dark mantle extend as far posteriorly as it does in *carbonacea* and *stelleri*, but shades more rapidly into the blue of the lower back and rump, as is the case with typical *frontalis*. What slight brownish tinge there may be on some specimens of these coast birds is mostly confined to the scapular region. The blue of the lower parts of the Requa birds is decidedly darker than that of any of the specimens secured farther south, that is to say, farther south than Humboldt Bay, and below. We did not have an opportunity to secure any jays between Requa and Humboldt Bay. These should show some gradation in regard to this darker coloration.

The jays taken in the end of September and beginning of October at Kneeland, Petrolia, and Thorn, were all of a rather lighter shade than those from Requa, but were all of the same general tone of coloration. Placing one of these alongside a bird of corresponding date from the San Francisco Bay region brought out the difference in a most convincing manner. A friend, whose artistic line of business calls for a keen appreciation of colors, was asked to examine the different jays here concerned and to give an unbiased opinion as to the correctness of my diagnosis of their color schemes. With absolutely no knowledge of birds, this friend without hesitation picked out the northwest coast birds from those of the central coast and placed them with the *frontalis*, as being most closely allied to that form, and secondarily with *stelleri*. This was done, of course, without looking at the labels, and was a strong confirmation of my diagnosis.

Recently I had the pleasure of going over with Dr. Fisher, the series of seventy-eight specimens of *Cyanocitta* secured during the Academy field work along the northwestern California coast in 1921, and directing his attention to the points I am endeavoring to bring out in this paper. He was greatly interested in the matter, and finally decided that he had not had sufficient material, nor a sufficiently extended knowledge of conditions pertaining to the subject at the time of writing his paper already referred to, upon the status of these jays, to do the subject full justice.

CONCLUSIONS

As a result of our work in the field, and of the examination of a large number of specimens (from the Museum of Vertebrate Zoology, University of California, from the Mailliard collection, and from that of the California Academy of Sciences), I have arrived at the conclusion that the crested jay along the northwest coast of California commences with the nearly typical Blue-fronted Jay (*Cyanocitta stelleri frontalis*) in the vicinity of Freestone, Sonoma County, just north of the open non-coniferous country that extends east from Tomales Bay to the Napa Valley; that toward the north along the coast these birds grow gradually darker, the darkest California specimens being found in the county of Del Norte in the northwest corner of the state; that this darkness increases northward along the Oregon and Washington coasts until merged into typical *stelleri*; that toward the interior of California, corresponding to the decrease of humidity

and increase of light, the northwest coast birds gradually revert to *frontalis* proper; and that most of the intermediates from the northern interior of this state are intermediate with *stelleri* and *not* with *carbonacea*. In northern Oregon and in Washington they are probably intermediate with *annectens*.

A specimen from central Oregon, taken at Bend, on the Deschutes River, by Alexander Walker, is recorded in the Condor, XIX, 1917, p. 137, as having been identified by Dr. H. C. Oberholser as *carbonacea*. This diagnosis does not fit in with this idea just set forth, but I have not seen the specimen in question and can not give any opinion upon it other than to suggest that it may be one of those indefinite individuals that are sometimes met with and which are very difficult to place.

While there appears to be some slight gradation between the Coast Jay, from south of the open stretch each of Tomales Bay to Napa Valley, with the Blue-fronted Jay, found just north of that region, such intermediates seem to be rather rare, less than half a dozen of the specimens examined showing indication of it. This open country is only some twenty miles across, but it seems to make a very effective barrier against the intermingling of these two races. In fact the above examples of supposed intergradation may be only cases of individual variation.

Toward the southern end of the habitat of the Coast Jay in Monterey County, however, we know that there is extensive intergradation, as proved by many specimens examined, with a gradual merging into the Blue-fronted Jay toward the interior and farther south.

Many geologists believe that at one time in the geological history of this coast an insular condition existed in that portion of it extending from Mt. Tamalpais, just north of San Francisco Bay, as far south as Monterey Bay, and that this territory was shut off by water from the interior. From Tomales Bay north, however, there seems to be no evidence of similar conditions having prevailed in any of that part of the coast of California.

Cyanocitta stelleri carbonacea now occupies the portion of the central California coast that was supposed at one time to be either an island, or a group of islands not widely separated. If this were the case, why not suppose that the genus *Cyanocitta* originally occupied the interior mountains of the state and spread toward the coast from there? Then, when the central coast subsided so as to bring about an insular condition, why not assume the hypothesis that this subsidence was of sufficiently long duration to evolve the race of *carbonacea* to suit the prevailing conditions; or, in other words, why may not *carbonacea* have been at one time an insular form?

California Academy of Sciences, San Francisco, April 3, 1922.